Texas Panhandle Pheasants:

Their History, Habitat Needs, Habitat Development Opportunities, and Future

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Abstract

Pheasants *(Phasianus colchicus)* colonized the Texas Panhandle in the late 1930's. Panhandle habitat is deficient in travel lanes, secure nesting cover, and over-winter cover. The high value of cropland limits habitat development, but cover plantings may be feasible on idle areas. Aquifer depletion will probably decrease pheasant populations in the future.

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Management Implications

The most severe habitat deficiencies of pheasants *(Phasianus colchicus)* in the Texas Panhandle, as in many portions of their range, are secure nesting cover, over-winter cover, and travel lanes. Habitat development is infeasible on croplands because of the substantial revenue that would be lost by taking these lands out of production. However, habitat development opportunities exist on playa lake basins, roadsides, dry corners associated with center-pivot sprinkler systems, and irrigation tail-water recovery pits. These areas, if undisturbed, would provide needed cover, but the natural vegetation communities that develop may be unacceptable to farmers. Thus, herbaceous plants that are attractive and able to outcompete "weeds" must be established. Such habitat developments would beautify the landscape, save energy (because control of weeds would be unnecessary), and benefit both game and nongame wildlife in the Texas Panhandle.

Introduction

Pheasants, Asian natives first established in Oregon in the 1880's (Edminster 1954), occur latitudinally from the Gulf Coast of Texas (Evans 1977) to the southern provinces of Canada, and longitudinally from the Atlantic Ocean to the Pacific Ocean (Johnsgard 1975). Their history, ecology, and management are well documented throughout most of this range. The birds have received little research attention in the Texas Panhandle.

Purposes of this study were to (1) consolidate available information on history; (2) determine habitat deficiencies; (3) determine habitat development opportunities consistent with social, economic, ecological, and agricultural constraints; and (4) assess the species' future in the Texas Panhandle.

Establishment and Range Expansion

The first recorded liberation of pheasants in Texas occurred along the Gulf Coast in 1933-1934 (Holloran and Howard 1956). About 400 birds were released on what is now Aransas National Wildlife Refuge, but none was seen after January 1939.

Yeager et al. (1956) reported that "the last state in the arid Southwest to initiate pheasant stocking was Texas, in 1939." This method of establishment conflicts with that described by Jones and Felts (1950), who wrote that pheasants drifted into Texas from Oklahoma or Kansas via Oklahoma beginning in 1939 or 1940. Evans (1977) indicated that "pheasants immigrated into the High Plains of Texas from Oklahoma during the 1940's." Parsons (1973) considered Colorado a possible source of Panhandle pheasants.

Oklahoma is the most likely source of Texas' pheasants for two reasons. First, massive releases occurred in Oklahoma beginning about 1910 (Hanson 1946). Second, ingress from Kansas or Colorado, although not impossible, seems implausible. Although it is only 61 km across the Oklahoma Panhandle from Colorado or Kansas to Texas, stable, huntable pheasant populations were found only in northern portions of Colorado (Yeager et al. 1956) and Kansas[2] in 1925-1930. To accept the hypothesis that birds from these states colonized Texas, we must assume they dispersed 300 km or more in 10-15 years. Ingress from New Mexico is unlikely, because the first successful introduction occurred in the southwestern part of that state in 1929 (Campbell 1976).

Though lacking proof, we suspect that private, unrecorded releases played a role in establishment of Panhandle pheasants, as was the case in Oklahoma and Kansas. In Oklahoma, citizens may have planted

[2]*Norman, Jim. 1970. Sketches from the history of pheasants in Kansas. 13th annual meeting, Midwest Pheasant Council. [Hays, Kans., April 6-10, 1970].*

more birds than were released by the Fish and Game Department (Hanson 1946). In Kansas private liberations beginning in the 1880's (Kimball et al. 1956) resulted in nucleus populations by 1904.[2]

About 10 years after their arrival in the Panhandle, pheasants occupied portions of at least 18 counties (fig. 1) and occurred primarily along waterways (Jones and Felts 1950). Release of countless birds by private individuals in nearly every Panhandle county aided range expansion and probably explains how pheasants crossed the Canadian River breaks, a broad expanse of rangeland considered a barrier to southward dispersal (Evans 1977). Populations of 1950 were described by Jones and Felts as intermittent, drifting, and spotted in distribution.

By the early 1970's there were pheasants in at least 24 Panhandle counties (fig. 2), though huntable populations existed in only 18 counties (Parsons 1973). Besides probable natural dispersal, releases by landowners, sportsmen, civic groups, and government agencies continued to expand pheasant range. From 1960 to 1973, the U.S. Soil Conservation Service distributed pheasants to landowners for release in Bailey, Crosby, Hale, and Terry counties.[3] The Texas Parks

[3]Unless otherwise cited, data are from the questionnaire survey shown in appendix A.

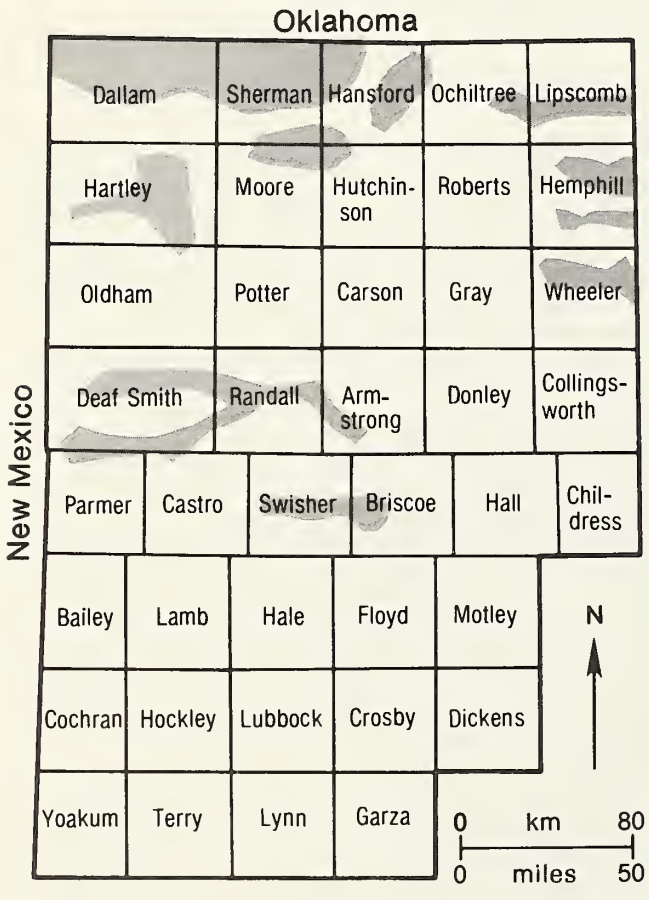

Figure 1.—Minimum distribution of pheasants in the Texas Panhandle in 1950 (Jones and Felts 1950).

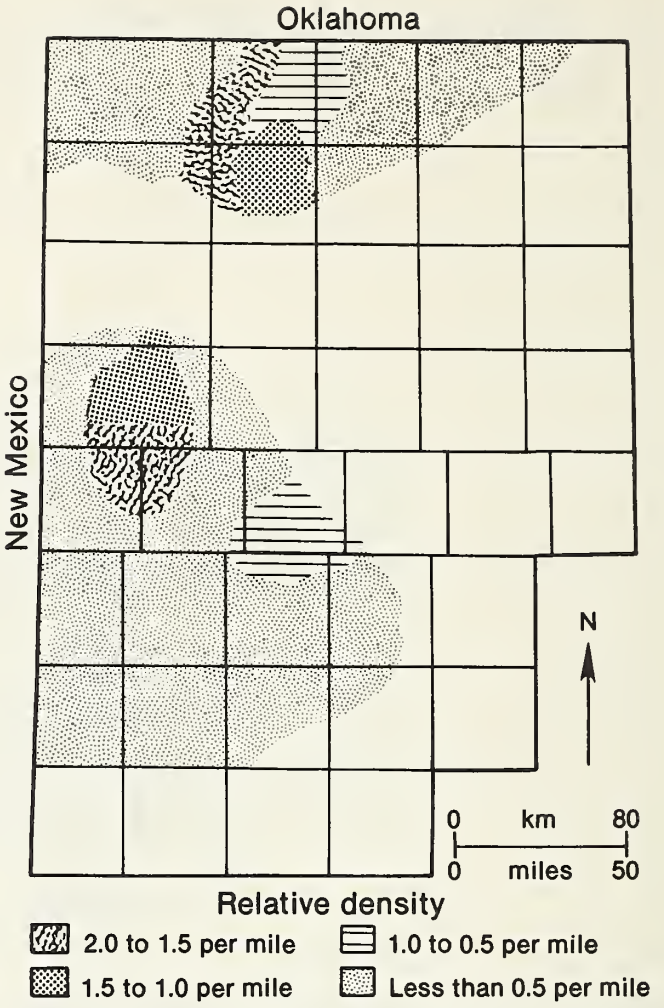

Figure 2.—Minimum distribution of pheasants in the Texas Panhandle in the early 1970's (Parsons 1973).

and Wildlife Department (TPWD) began liberating white-winged pheasants (*P. c. bianci*) in 1967 (Evans 1977) in Bailey and Hale counties where 100-200 birds were planted annually until 1969.[4] More recently, Farm Bureau members in Swisher County released pheasants, and 4-H Clubs and Future Farmers of America sold birds for liberation in Gaines County.

Pheasants occupied portions of at least 33 counties in 1977 (fig. 3). (See appendix A for methods used to determine distribution and relative density.) Whether populations in all of these counties are self-sustaining is unknown. Recent expansion of the range of Panhandle pheasants also has been caused by introductions. The TPWD has released some 2,100 birds in southern Gray and western Carson counties since 1974.[4]

Based on Pittman-Robertson reports filed at TPWD headquarters in Austin, Tex., management of Panhandle pheasants has consisted of liberations, counts along roadsides, establishing harvest regulations, and monitoring harvest. The first hunting season was held

[4]Dick DeArment, personal communication, Texas Parks and Wildlife Department, Wheeler, Tex.

in Dallam County in 1958 (see tabulation below) with a bag limit of two cocks per day and four in possession, which has remained the same to present. Counts along roadsides, initiated in 1960, were too few to judge temporal trends in abundance until 1972 when 15-19 transects were run. Fall counts along roadsides suggest gradually increasing populations from 1972 through 1976. The proportion of juvenile cocks in the hunting bag ranged between 12% and 70% during 1959 through 1973 and averaged 46.7% ± 4.8%. By comparison, this proportion averaged 71% in northwest Kansas during 1963 through 1967 (Norman 1971). Estimated legal kill was 24,000 cocks in 1976.[5]

Year	December dates	Counties
1958	13-14/20-21	Dallam
1959	12-13/19-20	Dallam
1960	10-11/17-18	Dallam, Sherman, Moore, Oldham
1961	9-10/16-17	Panhandle Regulatory District, 32 counties
1962	1-7	Northern two tiers
1963	1-7	Northern two tiers
1964	1-7	Panhandle Regulatory District, 33 counties
1965	1-7	33
1966	1-7	33
1967	1-7	33
1968	14-22	33
1969	13-21	33
1970	12-20	33
1971	11-19	33
1972	9-17	33
1973	8-23	33
1974	14-29	33
1975	13-28	33
1976	11-26	33
1977	10-25	33 + 8-day season in Terry County

Panhandle Habitat

Physical Environment

Two land resource areas, the High and Rolling Plains (fig. 4), comprise pheasant range in the Texas Panhandle. The Rolling Plains range in elevation from 330 to 1,000 m; have rolling topography with entrenched stream valleys; and have neutral to calcareous sandy loams, clay loams, and clays over loamy to clayey subsoils (Godfrey et al. [n.d.]). Because about 75% of the Rolling Plains currently consists of shortgrass range, this region is of marginal value to pheasants. The High Plains range in elevation from 1,000 to 1,330 m; have nearly level, practically undissected topography dotted with thousands of playa lake basins; and have mostly deep, neutral to calcareous clay loams, sandy loams, and sands over loamy to clayey subsoils.

[5]*News release from Texas Parks and Wildlife Department, Austin.*

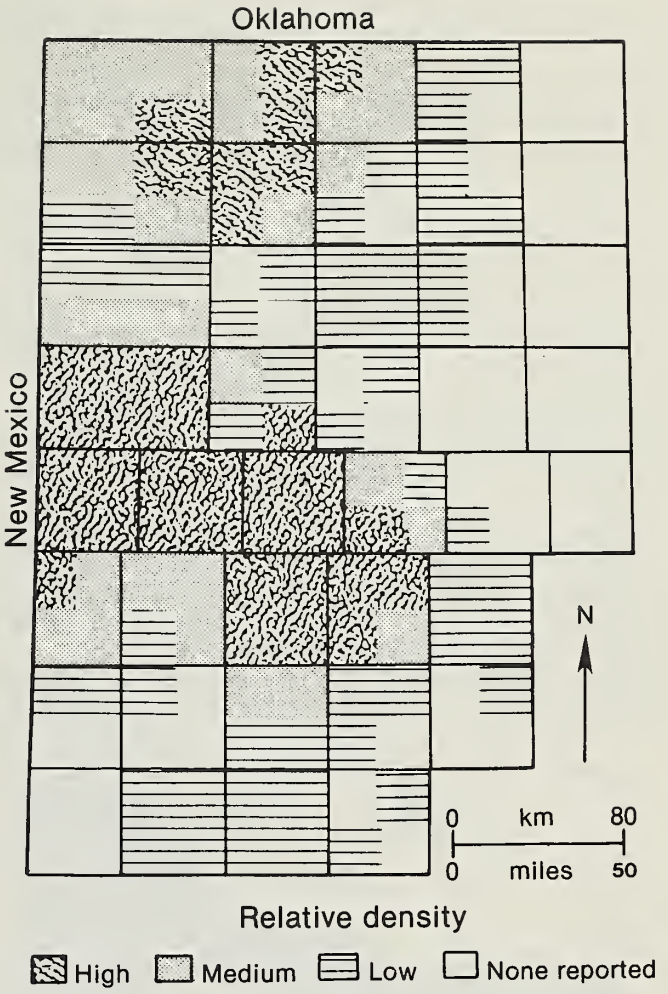

Figure 3.—Minimum distribution of pheasants in the Texas Panhandle in 1977 based on a questionnaire survey.

Climate of the Texas Panhandle is classified as midlatitude semiarid (Critchfield 1966). Mean annual precipitation (41-56 cm) and mean length of frost-free period (180-230 days) increase from west to east (Godfrey et al. 1973). Rainfall usually is low (10-20% of total) during November through March with peaks in April-May and September-October (Gould 1969, A. H. Belo Corporation 1975). The Panhandle has periodic droughts, annual snowfall averages 9-35 cm, and number of days with temperatures below freezing averages 50-110. Mean annual temperature is about 16° C.

Land Use and Habitat Deficiencies

Pheasants require cropland, grassland, and woody or rank herbaceous vegetation (Edminster 1954). Cropland provides food, as 70% or more of the adult pheasant diet typically is composed of grains. Corn is the most important crop, followed by the small grains. The type grassland described by Edminster is moderately dense herbaceous vegetation, composed either of grasses, forbs (e.g., alfalfa), or grass-forb mixtures.

The most important function of this type is nesting cover. Woody vegetation, such as windbreaks, orchards, woodlots, and bottomland trees, provides shelter during extremes of both heat and cold. Rank herbaceous vegetation, particularly cattails (*Typha* spp.) and associated wetland plants, also provides shelter.

Optimum land use patterns for pheasants include more than 50% of an area devoted to grains with 50% of the grain land in seed corn (Edminster 1954). Between 5% and 20% of the area should consist of mottes, woody ravines, woodlots, roadsides, ditchbanks, fencelines, and other odd areas forming a network of travel lanes. The balance should be in grass, legumes, or grass-legume mixtures, preferably harvested for seed. The minimum size for a pheasant management unit is about 30 km² (Gates and Hale 1974).

Baxter and Wolfe [n.d.] were more specific in recommendations of optimum land use patterns for pheasants in Nebraska. They suggested that a management unit consist of 42% corn or sorghum, 36% wheat, 14% grassland, 6% idle areas, and 2% alfalfa.

Texas Panhandle strata (fig. 4) provide low-quality pheasant habitat when compared to optimum patterns described by Edminster (1954) and Baxter and Wolfe [n.d.]. The southern stratum is particularly deficient because of high proportions of cotton and clean roadsides (tables 1 and 2). (See appendix B for methods used in land use and habitat surveys.) Rangeland and cotton comprise more than 70% of the eastern stratum. Our survey underestimated the proportion of rangeland in the north-central stratum because we avoided extensive rangeland areas in establishing transects. The northern and south-central strata have land use patterns providing the best pheasant habitat available in the High Plains. The south-central stratum is best overall because land use patterns are more diverse, irrigation (indexed by number of pumps per 10 km) is most highly developed, and playa lake basins are more abundant. All strata were deficient in idle (odd) areas and travel lanes. Optimum occurrence of travel lanes is probably about 25 per 10 km, but Panhandle areas had less than 11 travel lanes per 10 km.

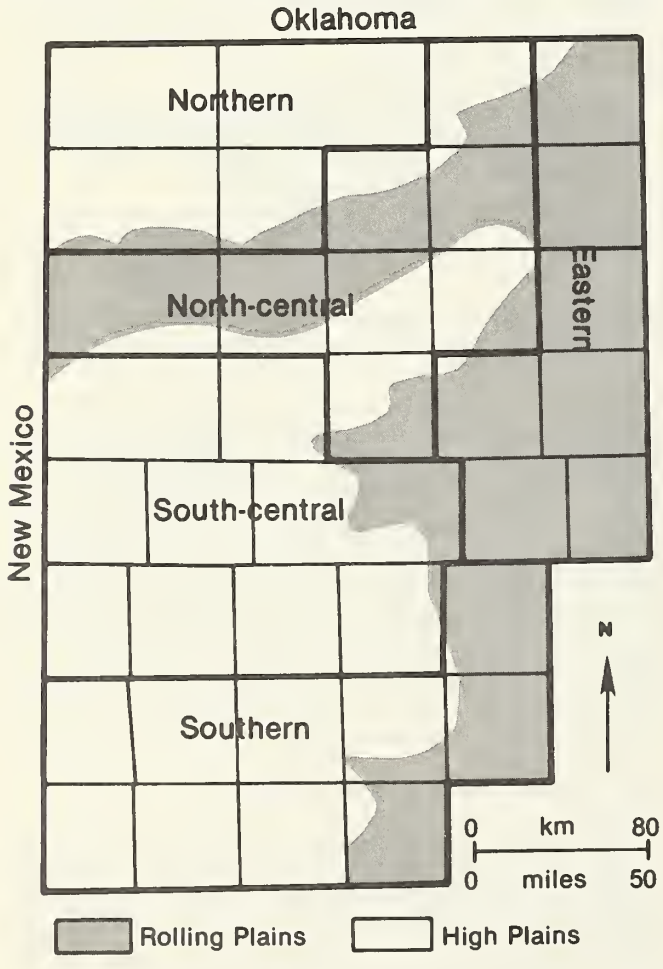

Figure 4.—Land resource areas of the Texas Panhandle and arbitrary stratification of counties based on relative pheasant density and geographical proximity.

A lack of secure nesting cover limits pheasant populations throughout their range (MacMullan 1961), including Texas (Parsons 1976). Although crops supply about 1.5 million ha of potential nesting cover (table 3), harvest and planting timetables in the Panhandle are inimical to nesting success (fig. 5). Hatching dates in Nebraska, which presumably would be similar to those in Texas, range from late April to mid-August with a peak in June (Baxter and Wolfe 1973), when harvest of small grains is peaking in Texas and other crops are being planted.

Playa lake basins, either modified (trenched to concentrate water and reduce evaporation) or unmodified, provide most noncultivated nesting habitat in the Panhandle. Estimates place the number of basins in this region between 17,000 (Lehman 1972) and 30,000 (Ward and Huddleston 1972). Reeves and Perry (1967) estimated 900-1,000 depressions occur per normal county area (2,300 km²).

Odd areas and travel lanes that could serve as nesting habitat are notably absent in the Texas Panhandle (table 2). Roadsides in areas of dryland farming support sparse cover, even if they are not bladed, disked, or mowed. Roadsides in irrigated areas provide more cover, including Johnsongrass (*Sorghum halepense*), annual sunflower (*Helianthus annus*), thistle (*Salsola kali*), red sprangletop (*Leptochloa filiformis*), and other species, but control of this vegetation is intense. Odd areas, extremely sparse, consist mainly of small, abandoned farmsteads. The flat topography of the High Plains precludes areas that are too steep to farm. Fencelines are scattered widely, though it is common practice to graze livestock on stubble and sprouting cereals by stringing temporary electric fences.

Rangeland occupies a large portion of the Panhandle (table 1) but provides nesting cover of poor quality. Most areas are grazed heavily, resulting in vegetation lower than the 25-cm limit required by nesting hens (Gates and Hale 1975).

Over-winter cover, like nesting habitat, is deficient in the Texas Panhandle (Parsons 1976). Crops provide

Table 1.—Estimated percentages of Texas Panhandle strata allocated to various land uses, mid-August 1978. Percentages are based on 240 sample points per stratum

Land use	Panhandle stratum				
	Northern	South-central	North-central	Southern	Eastern
Cotton	(1)[1]	19	0	74	23
Sorghum	18	8	20	10	5
Corn	10	18	3	(1)	0
Soybeans	(1)	4	0	(1)	0
Small grains	3	(1)	2	0	(1)
Hay	1	(1)	0	0	0
Vegetables and sugar beets	(1)	2	0	0	0
Rangeland					
Shortgrass range	17	12	21	3	43
Shin oak range	0	0	0	(1)	7
Tame pasture[2]	(1)	(1)	0	0	5
Fallow or tilled[3]	45	36	55	8	15
Other	3	(1)	(1)	1	2

[1]*Less than 0.1.*
[2]*Includes seeded rangeland.*
[3]*Over 90% of these areas were disked or plowed small grain fields.*

Table 2.—Habitat features for pheasants by Texas Panhandle strata, mid-August 1978

Habitat feature	Panhandle stratum				
	Northern	South-central	North-central	Southern	Eastern
	Percent				
Percentage of roadsides bladed, disked, or mowed[1]	79	69	73	96	69
	Number per 10 km				
Travel lanes	4.0	6.7	10.6	3.5	0.8
Windbreaks, mottes, and other woody shelters	6	2.9	1.7	3.0	(2)
Fenced playas	7	2.5	1.4	1.8	1
Unfenced playas	2	8	1	2	0
Weedy tail-water pits	6	4	1.1	0	0
Clean tail-water pits	9	5	6	2	(3)
Topographic draws	3	4	1.7	2	
Irrigation pumps	3.2	7.6	2.2	6.0	(3)
Odd areas	1.8	2.1	3.2	1.4	1

[1]*Roadside vegetation less than 30 cm tall.*
[2]*Many.*
[3]*Less than 1.*

Table 3.—Agricultural nesting habitat (thousands of hectares) available to pheasants in the Texas Panhandle[1]

Panhandle stratum	Small grains	Hay	Soybeans	Total
Northern	288	6	4	298
South-central	518	14	51	583
North-central	326	10	3	339
Southern	121	8	6	135
Eastern	174	17	(2)	191
Total	1,427	55	64	1,546

[1]*Data are from bulletins published jointly by the Texas Crop and Livestock Reporting Service and the U.S. Department of Agriculture.*
[2]*Less than 1.*

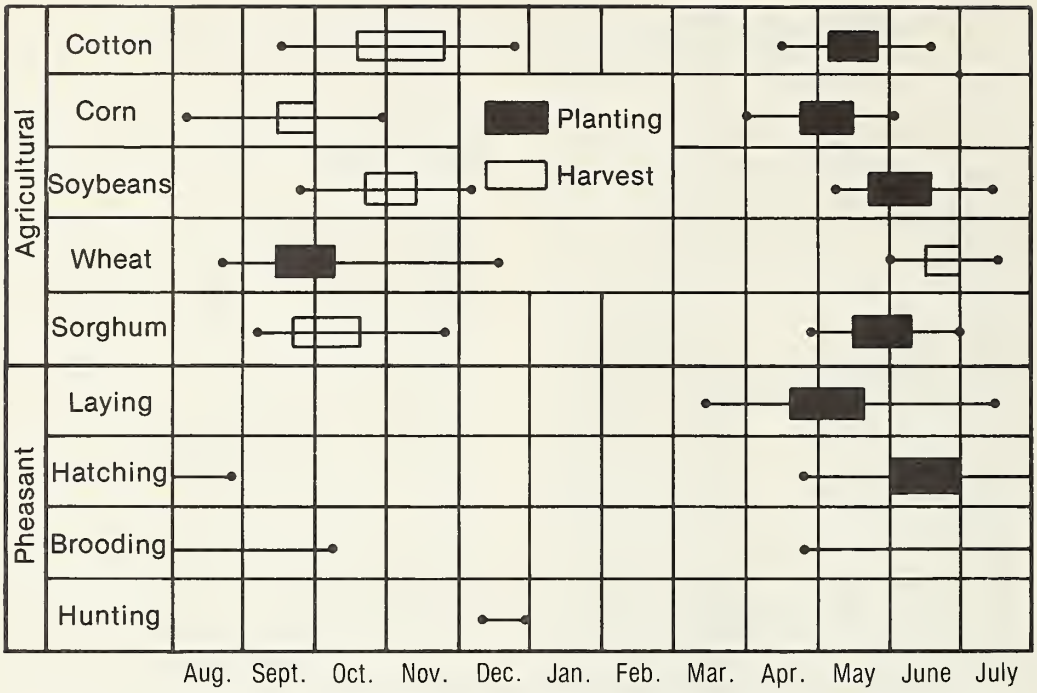

Figure 5.—Comparison of agricultural and presumed pheasant phenology on the High and Rolling Plains of Texas. Rectangles represent the approximate time span during which the middle 50% of the activity occurs.

little cover during late fall, winter, and spring because most have been harvested and fields are being prepared for planting (fig. 5). Windbreaks, mottes, and other woody shelters are sparse in four of five Panhandle strata (table 2). Thus, playa basins harboring rank herbaceous vegetation, tail-water pits with weedy perimeters, some roadsides, and abandoned farmsteads supply most overwinter cover.

Habitat Development Opportunities

We are proposing habitat development as opposed to habitat management. Development means creating habitat where either no habitat or marginal habitat had existed before. Thus, practices such as minimum tillage or delayed tillage of stubble which would benefit pheasants while costing landowners little or nothing are largely ignored. We recognize the value of such practices, but creation of stable habitat is the more pressing need of Panhandle pheasants.

The specific programs proposed appear to be (1) ecologically sound in that they would provide needed habitat (nesting cover, over-winter cover, and travel lanes) for Panhandle pheasants, (2) socially acceptable in that they would add to the diversity and esthetic appeal in landscapes, and (3) compatible with agriculture in that they can be incorporated into the existing agricultural system with little or no loss of productivity.

Playa Basin Developments

Without playas the Texas Panhandle would support substantially fewer pheasants. These depressions provide virtually all over-winter cover, serve as nesting and brooding cover, and supply foods such as barnyardgrass (*Echinochloa crusgalli*) and smartweeds (*Polygonum* spp.). Also, playas of moderate to large size cannot be farmed. Landowners likely would welcome the opportunity to turn some profit from these areas through leasing. Playa development is needed because about 75% of the playas in the northwest and south-central strata were classified as marginal pheasant habitat. Listed below are options for playa basins.

Small (<1 ha) basins on cropland (fig. 6).—Farmers expend time and fossil energy controlling weeds in such basins. An alternative approach is to establish an acceptable plant, perhaps alfalfa, in the depressions to simultaneously control weeds and provide cover for pheasants.

Medium-sized (5-15 ha) basins (fig. 7).—Outer zones of medium-sized playas may or may not be farmed in any given year, depending upon amount of rainfall. Average net returns from crops on such areas undoubtedly are low. Over the long run, farmers might save money by planting outer zones subject to periodic inundation to a species that both controls weeds and provides cover for pheasants. Leasing peripheral zones of playas, if necessary, should be less expensive than leasing stable cropland. Revenue losses from removal of grazing must be figured into the lease price.

Grazed basins (fig. 8).—Removal of grazing from any playa basin will improve pheasant habitat. An alternate plan is to begin grazing after the peak of spring hatch and end grazing early enough in the summer to

Figure 6.—Small, shallow playa lake basins on cropland, usually farmed or disked for weed control, offer opportunities for development of pheasant cover.

Figure 7.—Margins of medium-sized playa lake basins which cannot be farmed offer opportunities for development of pheasant cover.

ensure production of residual cover for next season's nesting.

Roadside Development

Roadsides offer vast opportunity for management in the Texas Panhandle because most are bladed, disked, or mowed (table 2). Distinct social, economic, and biological advantages are associated with management of roadside vegetation. Savings in fossil fuels would be substantial if roadsides were planted to a species that eliminated the need for control of noxious vegetation. Expenditure of state and county tax dollars would decrease in proportion to the amount of roadsides not requiring maintenance. Control of roadside vegetation is expensive. Joselyn et al. (1968) cited these figures for Illinois in 1963: "interstate highways $617 per km, and state highways $258 per km." They also reported that chick production on managed roadsides was higher than on any other cover type during 3 of 4 years of an Illinois study. Most Illinois farmers were receptive to managed roadsides (Warner and Joselyn 1978).

Managed roadsides typically are planted to an alfalfa-grass mixture (Joselyn et al. 1968). This mixture likely would be acceptable in the Texas Panhandle. Stands of alfalfa already have colonized some roadsides in the region.

A high frequency of spring sandstorms in the Texas Panhandle makes establishment of roadside habitat less feasible than in other areas. Blowing sand collects in roadside ditches, which must be cleaned periodically to allow road surfaces to drain. Roadside vegetation would accentuate the sand deposition problem. Also, some roadside ditches transport tailwater to recovery pits. Tall vegetation in the ditches would impair flow.

Dry-corner Developments

Scattered throughout the Texas Panhandle are center-pivot sprinkler systems that water about 52.8 ha. The circular system leaves four dry corners of 2.8 ha each. The dry corners usually are either disked for weed control or farmed. However, these areas offer opportunities for management of pheasant cover. The corners probably could be leased, if necessary, at relatively reasonable rates. As with management of playa lake perimeters and roadsides, vegetation that controls noxious weeds and provides pheasant cover would be required.

Travel-lane Developments

Small grains, sorghum, and corn in the northern and south-central Panhandle strata potentially supply large amounts of food to pheasants, but much of it is inaccessible because of a lack of travel lanes. Management of vegetation on county roadsides would be important for providing travel lanes for pheasants. However, additional travel lanes should be established.

No ready comprises between land use and establishment for travel lanes are apparent. Areas devoted to travel lanes will either have to be leased, or the landowner will have to have personal motives for estab-

Figure 8.—Removal of grazing will improve pheasant habitat on many playa basins.

lishing the cover. Small acreages would be required to establish a suitable network of travel lanes. If the lanes were 0.92 m wide, 4.4 km of length would occupy only 0.4 ha.

Tail-water-pit Developments

Between 40% and 50% of the tail-water recovery pits in the northern and south-central strata provide no pheasant cover (table 2) because associated vegetation is controlled rigorously (fig. 9). Since the basins cannot be farmed, they offer opportunity for pheasant habitat development. Once desirable vegetation is established, there is little or no need for control of noxious species, and less labor and fossil energy are expended. Managed tail-water pits could serve as nesting, loafing, and escape cover.

Future

Because land use in the Texas Panhandle cannot become much more intense, it would seem that the pheasant population should not be damaged by future conversions of suitable existing habitat into cropland or other uses. Declining water levels in the Ogallala Aquifer, however, bode ill for the species. This aquifer, geographically distributed approximately as the High Plains (fig. 4), is running dry because pumpage exceeds natural recharge. Projections for Castro County indicate that volume of water in the aquifer will decline over 60% by 2020 (Wyatt et al. 1976). Ground-water depletion will cause conversion of irrigated acreages to dryland farming or rangeland, which will harm pheasants. Impact of these conversions can be mitigated by stringent water conversion, but a future decline in Panhandle pheasant populations appears inevitable, notwithstanding water importation schemes.

As a preliminary step to enhance the future of Panhandle pheasants, basic research is indicated. The most pressing need is to document their life history, which is virtually unknown for this region. Such knowledge will allow us not only to optimize current use of the resource, but to suggest land uses which will have less negative impact on pheasants as irrigation decreases. Sound demographic data are needed for justifiable harvest regulations and for reliable economic models of habitat developments. Research should determine crude and specific densities, production of juveniles per unit area, survival rates of sex and age classes, harvest rates of cocks, mortality rates of hens caused by illegal shooting, and sources of nest losses. Because the Panhandle is ecologically atypical of classical pheasant range, it also is of interest to determine how pheasants have adapted to the land use and climate of this region. Knowledge of pheasant responses to cultivated habitats and to farming practices is essential to understanding population dynamics and to discovering trade-offs of mutual benefit to farmers and pheasants. As we have indicated, habitat development opportunities exist on roadsides, tail-water pits, and playa perimeters in the Panhandle. Research into the adaptability and suitability of various cover plants is in order.

Figure 9.—Tail-water recovery pits offer opportunities for development of pheasant cover.

We recognize that wildlife managers already have the technical wherewithal to make land produce pheasants. However, the economic pressures on modern farmers make it impossible to implement solid management programs. We must conclude that answers to pheasant declines lie not in routine management or research, but rather in public relations, promotion, and finance.

Perhaps the most encouraging development for the future of Panhandle pheasants is the recent incorporation of Pheasants Unlimited in Hale County, Texas. This group, which invests monies raised by raffles, auctions, and membership fees in habitat developments, may provide pheasants the economic and political boost they have sorely needed since the 1940's.

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Appendix A

Methods Used to Determine Distribution and Relative Density of Texas Panhandle Pheasants in 1977

We used a questionnaire, shown below, to determine 1977 distribution of pheasants in the Texas Panhandle. It was sent to 22 game management officers (TPWD) and 92 county extension agents in 41 counties (Yoakum, Terry, Lynn, Garza, Kent, Childress, and all counties to the north). Sixteen game management officers (73%) and 52 county extension agents (57%) responded. Twenty-five students and three faculty, Department of Range and Wildlife Management, Texas Tech University, also completed the questionnaire. Two biologists in the Panhandle provided additional data. Thus 98 individuals responded to the questionnaire.

We assumed that the number of respondents reporting occurrence in a given quarter of a county was correlated roughly with pheasant density. This number was used to establish relative density classes (high, medium, low, or none). A disproportionate concentration of respondents in Lubbock County may have caused an upward bias in relative density of this county.

Items from a questionaire used to determine distribution of ring-necked pheasants in the Texas Panhandle during 1977

Item	Question
1	Your county: _____ Name: _____ Phone: _____
2	Do ring-necked pheasants occur in your county? Yes _____ No _____
3	In which quarters of the county do pheasants occur? Southwest _____ Southeast _____ Northwest _____ Northeast _____
4	Please list other counties where you have seen pheasants in Texas.

County	Quarter of County
_____	SW _____ SE _____ NW _____ NE _____
_____	SW _____ SE _____ NW _____ NE _____
_____	SW _____ SE _____ NW _____ NE _____
_____	SW _____ SE _____ NW _____ NE _____
_____	SW _____ SE _____ NW _____ NE _____

5	Did pheasants naturally colonize your county from surrounding areas? Yes _____ No _____
6	About when did pheasants naturally colonize your county? 1930 _____ 1935 _____ 1945 _____ 1950 _____ 1955 _____ 1960 _____ 1965 _____ 1970 _____ 1975 _____
7	Have any farmers, ranchers, or sportsmen released pheasants in your county? Yes _____ No _____ Don't know _____. Please give dates, locations, people involved, and ultimate success of these releases, if you can.

Appendix B

Methods Used to Quantify Land Use and Habitat Features in the Texas Panhandle

Prior to a survey of land use and habitat features during August 14-16, 1978, we divided Panhandle counties into five strata based on geographical proximity and relative density of pheasants. Six 32-km transects were established arbitrarily in each stratum. Transects were on secondary roads except when it was necessary to travel short distances on paved roads. We avoided extensive areas of rangeland. At 1.6-km intervals along each transect, we recorded crops present in the two adjacent fields and condition of both roadsides (mowed, bladed, undisturbed). These data (240 points per stratum) were used to estimate proportions of a stratum allocated to various land uses and proportions of roadsides in the specified conditions. We tallied all habitat features (travel lanes proceeding at right angles away from the transect, patches of woody cover, playas, tail-water recovery pits, drainages, idle areas, and irrigation pumps) seen along the transect. Playa basins were classified as "fenced" if they received use from livestock or "unfenced" if they did not; tail-water pits were classified as "weedy" if they provided pheasant cover or "clean" if they did not.

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Guthery, Fred S., Jay Custer, and Mike Owen. 1980. Texas Panhandle pheasants: Their history, habitat needs, habitat development opportunities, and future. USDA Forest Service General Technical Report RM-74, 11 p. Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo.

Pheasants (*Phasianus colchicus*) colonized the Texas Panhandle in the late 1930's. Panhandle habitat is deficient in travel lanes, secure nesting cover, and over-winter cover. The high value of cropland limits habitat development, but cover plantings may be feasible on idle areas. Aquifer depletion will probably decrease pheasant populations in the future.

Keywords: *Phasianus colchicus*, habitat, Texas

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Rocky Mountains

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